Claims:

1. An optical performance monitoring device for a multi-channel communication system with a predetermined channel spacing, comprising:

a wavelength beam splitter characterized by a periodic spectral response with a period substantially equal to the channel spacing of the multi-channel communication system;

detector means for sensing and measuring a signal beam and a noise beam produced by the wavelength beam splitter; and

processing means for calculating a signal-to-noise ratio based on information derived from said detector means.

2. The device of Claim 1, wherein said wavelength beam splitter includes an optical cavity having an optical path length that produces a free-spectral range substantially equal to the channel spacing of the multi-channel communication system.

3. The device of Claim 1, further including a tunable filter to isolate a channel for processing out of said multi-channel communication system.

4. The device of Claim 2, further including a tunable filter to isolate a channel for processing out of said multi-channel communication system.

5. The device of Claim 1, further including additional processing means for calculating a center frequency of a channel in said signal beam.

6. The device of Claim 2, further including additional processing means for calculating a center frequency of a channel in said signal beam.

7. The device of Claim 1, further comprising a switch for alternate processing of said signal beam and noise beam produced by the wavelength beam splitter prior to feeding said beams to the detector means.

8. The device of Claim 7, further comprising a grating to disperse said signal beam and noise beam produced by the wavelength beam splitter prior to feeding said signal and noise beams to the detector means.

9. The device of Claim 2, further comprising a switch for alternate processing of said signal beam and noise beam produced by the wavelength beam splitter prior to feeding said signal and noise beams to the detector means.

10. The device of Claim 9, further comprising a grating to disperse said signal beam and noise beam produced by the wavelength beam splitter prior to feeding said signal and noise beams to the detector means.

11. The device of Claim 1, further comprising a beam splitter and a switch, said beam splitter for splitting an input beam into a portion thereof directed to said wavelength beam splitter and another portion thereof directed to the switch, and the switch for alternately processing said other portion of the input beam and said noise beam produced by the wavelength beam splitter prior to feeding said other portion of the input beam and said noise beam to the detector means.

12. The device of Claim 11, further comprising a grating to disperse said other portion of the input beam and said noise beam produced by the wavelength beam splitter prior to feeding said other portion of the input beam and said noise beam to the detector means.

13. The device of Claim 2, further comprising a beam splitter and a switch, said beam splitter for splitting an input beam into a portion thereof directed to said wavelength beam splitter and another portion thereof directed to the switch, and the switch for alternately processing said other portion of the input beam and said noise beam produced by the wavelength beam splitter prior to feeding said other portion of the input beam and said noise beam to the detector means.

14. The device of Claim 13, further comprising a grating to disperse said other portion of the input beam and said noise beam produced by the wavelength beam splitter prior to feeding said other portion of the input beam and said noise beam to the detector means.

15. The device of Claim 3, wherein said tunable filter includes a rotating element that produces a retro-reflected beam, and said beam is utilized as a measure of an initial angle of incidence of an input beam for an initial calibration of an angle of rotation of the tunable filter.

16. The device of Claim 14, wherein said tunable filter further includes an encoder to measure said angle of rotation of the tunable filter.

17. An optical performance monitoring device for a multi-channel communication system with a predetermined channel spacing, comprising:

a tunable filter to isolate a channel for processing out of said multi-channel communication system, wherein said tunable filter includes a rotating element that produces a retro-reflected beam, and said beam is utilized as a measure of an initial angle of incidence of an input beam for an initial calibration of an angle of rotation of the tunable filter; and

an encoder to measure said angle of rotation of the tunable filter.

18. An optical performance monitoring device for a multi-channel communication system with a predetermined channel spacing, comprising:

a wavelength beam splitter characterized by a periodic spectral response with a period substantially equal to the channel spacing of the multi-channel communication system;

detector means for sensing and measuring a signal beam and a noise beam produced by the wavelength beam splitter; and

processing means for calculating a wavelength error based on information derived from said signal beam.

19. A method of monitoring optical performance in a multi-channel communication system with a predetermined channel spacing, comprising the following steps:

providing a wavelength beam splitter characterized by a periodic spectral response with a period substantially equal to the channel spacing of the multi-channel communication system;

splitting an input beam into a signal beam and a noise beam using said wavelength beam splitter;

sensing and measuring said signal beam and said noise beam produced by the wavelength beam splitter; and

calculating a signal-to-noise ratio based on information derived from measuring said signal and noise beams.

20. The method of Claim 19, further including the step of filtering said input beam to isolate a channel for processing out of said multi-channel communication system.

21. The method of Claim 19, further including the step of alternatively transmitting said signal beam or said noise beam produced by the splitting step for the sensing and measuring step.

22. The method of Claim 21, further comprising the step of dispersing said signal beam and noise beam produced by the splitting step prior to the sensing and measuring step.

23. The method of Claim 19, further including the steps of splitting said input beam, feeding a portion of the input beam to a switch and another portion of the input beam to the wavelength beam splitter to produce a signal beam and a noise beam, feeding the noise beam to the switch, and alternatively transmitting said other portion of the input beam or said noise beam produced by the wavelength beam splitter for the sensing and measuring step.

24. The method of Claim 23, further comprising the step of dispersing said other portion of the input beam and said noise beam produced by the wavelength beam splitter prior to the sensing and measuring step.

25. The method of Claim 23, further comprising the step of dispersing said other portion of the input beam and said noise beam produced by the wavelength beam splitter prior to the sensing and measuring step.

26. A method for monitoring optical performance of a multi-channel communication system with a predetermined channel spacing, comprising the steps of:

splitting an input beam into a signal beam and a noise beam using a wavelength beam splitter characterized by a periodic spectral response with a period substantially equal to the channel spacing of the multi-channel communication system;

detecting and measuring said signal beam and noise beam produced by the wavelength beam splitter; and

calculating a wavelength error based on information derived from said signal beam.

27. A method for monitoring optical performance of a multi-channel communication system with a predetermined channel spacing, comprising the steps of:

isolating for processing a channel out of said multi-channel communication system using a tunable filter that includes a rotating element that produces a retro-reflected beam;

utilizing said beam as a measure of an initial angle of incidence of an input beam for an initial calibration of an angle of rotation of the tunable filter;

using an encoder to measure said angle of rotation of the tunable filter; and

calculating a wavelength error based on information about said angle of rotation provided by said encoder.